MDOT
Michigan Department of Transportation

OFFICE MEMORANDUM

DATE: November 24, 2008

TO: Region Engineers
Region Delivery Engineers
TSC Managers
Resident/Project Engineers
Region Construction Engineers

FROM: Larry E. Tibbits
Chief Operations Officer

John C. Friend
Engineer of Delivery

SUBJECT: Bureau of Highway Instructional Memorandum 2008-15
Open Graded Drainage Course, Modified FUSP 03SP303(A)

Over the past several years, open-graded drainage course (OGDC) has been a major topic for discussion between the department and the highway construction industry. Recent concerns relative to the numerous versions of OGDC special provisions being inserted into projects prompted the department to engage in efforts to consolidate the current approved *Special Provision for Open-Graded Drainage Course, Modified* and *Special Provision for Aggregate Base-Modified* into a single statewide approved frequently used special provision.

A team of Construction and Technology Division and region materials experts engaged in extensive dialogue over the past year to develop the attached frequently used special provision *03SP303(A), Special Provision for Open-Graded for Drainage Course, Modified (FHWA Approved 11-01-08)*. Revisions are based on extensive laboratory investigations, analysis of historical field test data, and consensus between all stakeholders relative to statewide technical and operational concerns. Particular attention must be given to the fact that this revised frequently used special provision permits statewide inclusion of natural aggregates, iron blast furnace slag, reverberatory furnace slag, or recycled crushed concrete. Tables 303-1 and 303-2 were incorporated to account for potential breakdown of these materials during transport and handling, depending on where the engineer prefers the OGDC to be sampled and tested.

Beginning with the December 2008 letting, all projects that include open-graded aggregates shall contain *03SP303(A), Special Provision for Open-Graded Drainage Course, Modified (FHWA Approved 11-01-08)*. This special provision must not be modified in any way. All previous versions of the *Special Provision for Open-Graded Drainage Course, Modified* and *Special Provision for Aggregate Base-Modified* are no longer permitted for use on future department projects. You may incorporate this special provision into projects let prior to December 2008, if mutually agreed to by the engineer and contractor. A copy of this instructional memorandum,

accompanied by an executed no-cost, no-credit, no-extension-of-time work order, shall be placed in the project files documenting the contractual change and fulfillment of audit requirements.

The Design Division's Specifications and Estimates Unit will add 03SP303(A) to the Design SS/SP system. All other special provisions referencing open-graded aggregates or aggregate base-modified (for roadway base applications) are no longer permitted to be used on department projects.

Please contact Al Robords (517-322-1357) or John Staton (517-322-5701) from the Construction and Technology Division with questions regarding the use of these special provisions.

Chief Operations Officer

Engineer of Delivery

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Index: Materials

Attachment

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MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
OPEN-GRADED DRAINAGE COURSE, MODIFIED

Delete Section 303, on pages 167, 168 and 169 of the 2003 Standard Specifications for Construction, in its entirety and replace with the following:

303.01 Description. Construct an open-graded drainage course (OGDC) on an approved surface according to the details shown on the plans.

303.02 Materials. Use the following materials.

4G open-graded aggregate meeting the gradation requirements listed in Table 303-1 prior to placement and compaction on the grade. Use open-graded aggregate obtained from natural aggregate, iron blast furnace slag, reverberatory furnace slag, or recycled crushed concrete. These open-graded aggregates must, also, meet the physical requirements listed in Table 902-2. The compacted in-place gradation requirements are as shown in Table 303-2.

Table 303-1 Prior to Placement Gradation Limits

Sieve	Gradation Limits, percent passing
1-1/2 inch	100
1 inch	85 – 100
1/2 inch	45 - 65
# 8	15 - 30
# 30	6 -18
Loss by Wash	6.0 max

Table 303-2 Compacted In-Place Gradation Limits

Sieve	Gradation Limits, percent passing
1-1/2 inch	100
1 inch	85 – 100
1/2 inch	45 - 70
#8	15 - 35
# 30	8 -22
Loss by Wash	8.0 max

303.03 Construction.

A. **Preparation.** Furnish and install the separation treatment, as specified on the plans, between the OGDC and the subbase or subgrade.

B. **Placement and Compaction.** Place open-graded aggregate according to subsection 302.03 except each individual layer will not exceed 8 inches in thickness. Provide a finished surface, smooth and uniform in appearance that is free of loose aggregate, holes, depressions, ruts and ridges.

1. **Control Strip.** Construct a control strip with a minimum length of 600 feet at the start of the spreading operation to establish a construction method for placement and compaction that does not cause degradation or segregation detrimental to base stability and drainability. The Engineer will obtain an in-place sample from the control strip and test for Loss by Washing (LBW) and Gradation (Table 303-2), after placement, compaction and final trimming. In addition, the density will be verified to meet the minimum 95 percent of the maximum unit weight with the moisture content not greater than optimum. Do not place OGDC beyond the limits of the control strip until an acceptable placement method is determined and verified by test results. When contiguous plan quantities are less than 10,000 square yards, the Engineer may waive the control strip requirement. However, the minimum density requirement will still apply.

C. **Equipment Travel.** Prior to use for equipment travel, place at least 2 inches more than the finished thickness of the OGDC layer on the grade. All costs associated with placement of the additional aggregate and removal or trimming thereof will be borne by the Contractor. Stockpile and retest any removed OGDC aggregate to verify the aggregate meets the specification requirements for the intended item of use on this or any Department project.

Where no lateral space exists due to permanent physical obstructions, maintaining traffic requirements or other unavoidable conditions, delivery to the paver via OGDC will be permitted provided that: 1) the specified in-place OGDC gradation is maintained and no other damage to the OGDC, subbase or subgrade occurs; and 2) varied truck routes or paths are used to minimize the potential for damage to the OGDC.

Correct all observed damage to the OGDC layer, subbase or subgrade resulting from equipment travel, according to subsection 303.03.B. Protect the underdrain system from damage at all times and locations.

D. **Seasonal Shutdown.** When construction resumes after seasonal shutdown, the Engineer will inspect for approval all OGDC that was completed and allowed to remain uncovered during seasonal shutdown. As directed by the Engineer, spread, compact and trim additional 4G aggregate over the previously placed OGDC to meet specifications. All costs associated with returning the exposed OGDC to specification requirements will be borne by the Contractor.

E. **Sampling Location.** Sampling of OGDC will be from one of the following locations:

1. The shipping face of the stockpile using mini-stockpiles at the production source.

2. The shipping face of the stockpile using mini-stockpiles at a dock or other intermediate commercial supplier’s storage location.

3. An individual truck dump or a composite sample made up of several truck dumps as the 4G aggregate is being delivered to a job site stockpile.

4. From the project grade after placement, compaction and final trimming.

F. **Testing and Acceptance.** The Engineer will identify in writing the preferred sample location from those listed in paragraph 303.03.E at the Pre-Construction meeting and at the Pre-Bid meeting, if applicable. However, the Engineer may designate a new preferred sample location should circumstances change during construction. All tests of materials will be performed according to methods specified in the contract documents. Mechanical methods may be used to assist in obtaining samples from the grade when layer thicknesses are greater than 4 inches. All sampling and testing must be performed by a Michigan Certified Aggregate Technician.

The Contractor will make allowance for and be solely responsible for degradation and segregation during shipment, placement and compaction of the open-graded material.

1. **Daily Verification**. Each day, the Engineer will monitor and document the construction method established during Control Strip placement is being followed. In addition, compactive effort or stability will be verified a minimum of once each day of placement by one of the following options.

   a. **Proof Roll**. Complete a proof roll using a fully loaded dump truck. The Engineer will witness and document the proof roll and will determine the proper course of action to correct any observed rutting or displacement.

   b. **Control Density Testing.** In-place density control testing to verify at least 95 percent of the maximum unit weight with the moisture content not greater than optimum has been achieved for each individual layer.

      The Engineer may approve modifications to the process established during the Control Strip if the in-place gradation is not compromised and the compactive effort or stability can be verified.

      When the Engineer waives the Control Strip for a project under the conditions of subsection 303.03.B.1, in-place field testing is required to verify placement and compaction methods are achieving at least 95 percent of the maximum unit weight with the moisture content not greater than optimum for each individual layer. In-place testing frequency will be the same as listed for Aggregate Base Courses in the MDOT Density Control Handbook.

2. **Notification Requirements.** Notify the Engineer and construct another 600-foot control strip if any of the listed changes occurs: 1) placement procedures, 2) if equipment used in the placement of the previous control strip is removed from service or replaced, or 3) a switch in the material source. The new control strip must be tested and approved by the Engineer prior to the resumption of OGDC placement.

3. **Prior to Placement Acceptance Criteria**. Material not meeting gradation or LBW limits in Table 303-1, will not be permitted to be placed on the grade.

4. **Compacted In-Place Acceptance Criteria.** The Engineer may sample and test the compacted in-place OGDC for final acceptance. If segregation, contamination, or excessive degradation is observed, the Engineer will provide written notification of the need for in-place testing and determine the limits of the area subject to in-place acceptance not to exceed 500 feet for each occurrence. All OGDC material placed or paved over after receipt of notification of the need for in-place testing may be deemed to be unauthorized work as specified by subsection 104.05.

   Discontinue OGDC placement upon receipt of notification of the need for in-place acceptance testing. Stop the paving operation at least 500 feet before the OGDC area subject to in-place acceptance testing. Resume OGDC placement and paving operations only with the Engineer's approval. Approval may require constructing and testing another 600-foot control strip according to subsection 303.03.B.1.

   The Engineer will sample from within the defined area. Two additional samples will be obtained, one from each adjacent side of the defined area for in-place acceptance testing. Each test area will have a maximum length of 500 feet. All three acceptance tests will be completed within 48 hours of the time the samples were obtained from the project.

   The in-place aggregate gradation for any test area, including control strips, must conform to the specified gradation limits shown in Table 303-2. Test results outside these limits will be subject to pay adjustment or remove and replace requirements described in subsection 303.04.

303.04 Measurement and Payment.

Contract Item (Pay Item)	**Pay Unit**
Open-Graded Dr Cse, ___ inch, Modified	Square Yard
Open-Graded Dr Cse, CIP, Modified	Cubic Yard

A. **Open-Graded Dr Cse, ___ inch, Modified** will be measured according to the methods in section 302. Payment includes; furnishing the crushed aggregate, placing, spreading, shaping, compacting, trimming, protecting the underdrain system and all costs associated with constructing control strips, corrective action, including corrections due to seasonal shut down, necessary to rectify degradation and segregation are included in the associated item of work. These contract items are subject to the pay adjustments described herein.

B. **Open-Graded Dr Cse, CIP, Modified** will be measured based on plan quantity by volume in cubic yards. The plan quantity will include all the OGDC below the paved shoulder and median to the top of the proposed subbase, as defined by the plan typical sections. If the Engineer determines that it is not feasible to determine quantities based on plan quantities, measurement for **Open-Graded Dr Cse, CIP, Modified** will be based on the staked-section method as described for Roadway Earthwork in subsection 205.04.

C. When the pay item **Open-Graded Dr Cse, CIP, Modified** is not included, payment will be included in the pay item for **Open-Graded Dr Cse, ___ inch, Modified**.

When the Engineer calls for in-place testing with written notification as described in subsection 303.03.F.4, only those costs associated with a failing test result will be borne by the Contractor.

D. **Pay Adjustment Computation.** Pay adjustments are not cumulative; only the largest of the computed pay adjustments will be applied. All pay adjustments are negative. Pay adjustments are computed using the following formula:

Pay Adjustment = Pay Factor Reduction X (quantity) X (base price)

Where:

Pay Factor Reduction = Value shown in Table 3 or 4 as applicable (expressed as a decimal)

Quantity = Quantity subject to adjustment

Base Price = Unit price established by the Department and shown in the contract documents

Apply computed pay adjustments using Tables 303-3 and 303-4 for material tested in-place according to subsection 303.03.F.4.

Table 303-3 Pay Factor Reduction for In-Place OGDC Exceeding Gradation Limits on Any Sieve (Excludes LBW)

Amount Exceeding Gradation Limit (a)	Pay Factor Reduction, %
1	0
2 – 3	10
4 – 6	30
> 6	(b)

a. As shown in Table 303-2.
b. The Engineer will either require removal and replacement of the material or apply a 50% pay factor to the material. The Engineer may refer to the discussion of Disposition of Materials Based on Laboratory Test Results in Section A4 of the MDOT *Materials Quality Assurance Procedures Manual* when making this decision.

Table 303-4 Pay Factor Reduction for In-Place OGDC Exceeding Loss by Wash Limits

Amount Exceeding Gradation Limit (a)	Pay Factor Reduction, %
<0.5	0
0.5 – 1.0	20
>1.0 – 1.5	30
>1.5 – 2.0	40
>2.0	(b)

a. As shown in Table 303-2.
b. The Engineer will require removal and replacement of the material. The Engineer may refer to the discussion of Disposition of Materials Based on Laboratory Test Results in Section A4 of the MDOT *Materials Quality Assurance Procedures Manual* when making this decision.